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16. ABSTRACT

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This paper discusses a problem the 1st Infantry Division Fire Support Element faced during train up for deployment to Operation Iraqi Freedom II, and the solution. The solution is the 1st Infantry Division Artillery Portal – a Web-based fire support information system. The Portal provides battlefield operating system staffs and units the ability to submit and access near real-time fire support information and perform dynamic analysis. The Artillery Portal is neither theoretical nor short-lived. The Web-based system has been used since February 2004. The 1st Infantry Division, 42nd Infantry Division, and 101st Airborne Fire Supporters used and still use the Artillery Portal on a daily basis.

The 1st Infantry Division Artillery Portal received a 2004 Army Knowledge Award for Transformation Initiative in Battlefield Applications.

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Web-Based Fire Support Information System

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A challenge facing division and lower staffs is the efficient and effective use of information-age technologies while performing the six basic functions of an operations center. The importance of performing these functions has not changed over time; however, rapid advances in the conduct of modern warfare require change in the methods and systems used.

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INTRODUCTION

The summer of 2003 marked the beginning of pivotal changes for the Germany-based 1st Infantry Division (1 ID). The division's primary mission in previous years was peacekeeping operations in the Balkan region. 1 ID continuously rotated Brigade Combat Teams (BCT) to Bosnia and Kosovo. The new mission was to deploy the division in support of Operation Iraqi Freedom II (OIF II) and to conduct full spectrum operations. This change of mission necessitated an intense training period or Road to War, and it required an upgrade of most command and control (C2) systems and associated procedures. In contrast to units deployed in support of OIF I, 1 ID was a

"legacy division." The division did not possess the more sophisticated digital systems needed for operations in Iraq. From August to December 2003, the Road to War outlined gunnery, command post exercises (CPX), and digital systems fielding and training. Before deploying in February 2004, 1 ID successfully transformed from a legacy division to a division with digital systems. Fielding digital systems greatly enhanced the division's warfighting resources. Enhancements were most noticeable in increased situational awareness capabilities and the ability to perform C2. However, new challenges arose and some former challenges persisted. This paper discusses a problem the 1st Infantry Division Artillery (Div Arty) Fire Support Element (FSE) faced and the solution. The solution presented here is neither theoretical nor short-lived; in fact, the solution as fielded in February 2004 and used throughout OIF II and OIF III is currently employed in Iraq.

BACKGROUND

1 ID's Road to War for OIF II, shown in Figure 1, began with a series of CPXs. The culminating event was the division's Warfighter just prior to deployment.

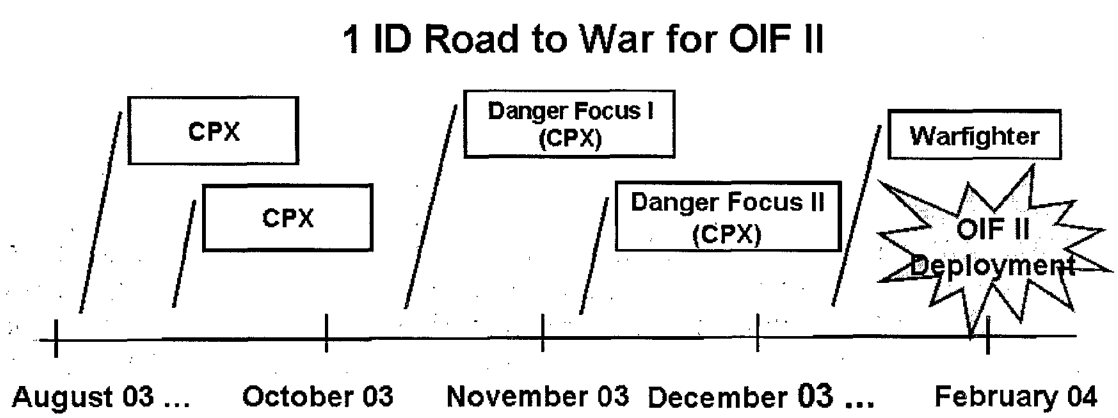

Figure 1. 1st Infantry Division's timeline for CPXs before deploying in support of OIF II.

During this intense five-month training period, command posts (CP) from battalion to division and their staffs fielded, trained, and became proficient in the use of several Army Battle Command Systems (ABCS) components. Specifically, intelligence sections gained the All Sources Analysis System-Light (ASAS-L). Operations sections gained the Maneuver Control System-Light (MCS-L). Fire supporters gained the Advanced Field Artillery Tactical Data System (AFATDS) and the Effects Management Tool (EMT). ASAS-L, MCS-L, and AFATDS/EMT provided CPs unprecedented graphical situational awareness. A few clicks of a mouse allowed a battle captain to graphically show in virtually real-time the location of enemy attacks, location of a unit of interest, or location of a radar and its search fan. Senior leaders valued the increased situational awareness available through the new information technology (IT) and especially the staff's ability to provide situational updates in near real-time. Unfortunately, the advantage of being able to show the exact locations of the most recent enemy attacks lasted only a few Battle Update Briefs (BUB). Senior leaders began asking, "So what? What does that tell me?" Leaders at all levels sought... they demanded the almost instantaneous transformation of data into relevant information. The variety of data

sources now available and their speed of delivery of a plethora of data created a compressed decision/analysis timeframe for commanders to make decisions. Battlefield conditions rapidly changed and commanders had to quickly make decisions and respond. As a result, staffs had less time to perform their functions, the basic functions of a Tactical Operations Center (TOC) or CP, in order to help commanders make decisions (Macgregor 1997: p50).

Field Manual (FM) 3-90.3, The Mounted Brigade Combat Team, outlines the basic functions of a TOC: receive information, distribute information, analyze information, submit recommendations, integrate resources, and synchronize resources (Department of the Army 2001b: p3-15). ABCS components assist with these basic functions, but their real strength is providing superb geographical situational awareness. While providing geographical situational awareness is an advantage, support for the information management functions associated with the basic TOC functions is not. Information Management encompasses procedures and information systems to collect, process, store, display, and disseminate information (Department of the Army 2001a: p11-11). The leaders' questions could only be answered by adding meaning to data. Supplying meaning required effective processing which in turn required analysis (Department of the Army 2001a: p11-11). But because CPs are equipped with ABCS components that are not user friendly, obtaining the data to process and perform analyses is complicated and most often times impractical (Boden and Philman 2005: p51). The current ABCS components leave much to be desired; CPs require robust information systems to perform the vital information management functions.

Attempts to fill the gap of not having an information system included using existing programs such as email and the division's Web-based folder system, the Digital Dashboard. Our initial attempt, to use email, required that manpower be allocated for the sending and receiving of data requests and the consolidation of data from several messages before analyses could be performed. The staff did not have the capability to provide information and analyses based on the most current state of operations. Each time data changed or an update was requested due to changing battlefield conditions, the process had to be conducted again. Thus, staffs wasted valuable time performing time-consuming information management tasks.

The Digital Dashboard was our second attempt to fill the gap. The dashboard allowed units and staffs to upload and download files that contained reports. Files were spreadsheets, slide presentations, and word processed documents. The drawback of this system was the bandwidth limited communications architecture in the Iraqi Theater of Operations (ITO). Uploading and downloading large files consumed much of the available bandwidth thereby causing long customer wait times. 1 ID simulated the projected bandwidth limitations of the ITO during the Road to War. This experiment provided soldiers and leaders realization of the impending delays. During a CPX After Action Review, a brigade commander recalled watching a soldier wait 45 minutes to download a report. Staffs could not afford these types of delays. Emailing or posting spreadsheets, slide presentations, and word processed documents in shared folders were obviously not viable solutions. Data collection took too long and left little or no time to perform the analyses needed in order to answer senior leader questions. The pace of staff work dictated that an information system facilitate a faster process. Staffs needed efficient and effective information systems in order to meet the commander's

requirements of being able to respond to changing battlefield conditions (Linderman et al 2005: p1).

PROBLEM DEFINITION

Network Centric Operations (NCO) presents a new challenge for commanders and their staffs. Unless properly managed, the amount of information now available through NCO may overwhelm the commander and staff (Wallace 2005: p3). Staffs must have the tools that facilitate the dynamic transformation of data into information and provide analyses within shorter periods of time. The components of the ABCS provide enhanced information flow in the form of unprecedented near real-time situational updates. However, extracting aggregate information and quickly performing analyses are not easily accomplished. For example, ASAS-L provides intelligence sections the capability of cataloging Anti Iraqi Force (AIF) indirect fire attacks on coalition Forward Operating Bases (FOB). AFATDS/EMT allows FSEs to catalog radar acquisition data and friendly counterfire mission data for AIF indirect fire attacks. MCS-L provides operations sections the ability to obtain friendly force updates and responses to AIF indirect fire attacks. The data each section collects for these attacks is related. But sections only have access to the data within their "box" and cannot retrieve the supplemental the data that helps build a more complete picture. For example, the FSE uses their AFATDS/EMT to obtain radar acquisition data but does not have access to the intelligence section's ASAS-L data.

The lack of systems that support information sharing and collaborative interactions sustains stovepipes within the TOC and its sections (Alberts and Hayes 2003: p174). Stovepiping supports the vertical flow of information but prevents the horizontal flow and sharing of information within the TOC or with other entities. An unwanted consequence is the inability to see linkages between pieces of data (Abuhantash and Shoultz 2004: p1). Additionally stovepiping fosters duplication of effort and redundancy in data collection – a waste of time and resources. To more effectively accomplish their functions in the Information-Age, staffs must zealously reduce inefficiencies and unnecessary overlap (Harrison 1999: p15).

AIF indirect fire attacks are of interest to the FSE, intelligence section, and operations section. Data points such as date/time of attack, impact coordinates, enemy firing position coordinates, weapon caliber, radar acquisition data, equipment damage and casualties, and friendly response are just a few of the data each section needs. The intersection of all three data requirements, see Figure 2, is "Common Data." Almost always each staff cell attempts to collect data that is best obtained through effective information management and data sharing. Unfortunately it is not uncommon for staff sections to obtain and use incorrect data for analyses. When discovered, these occurrences lead to confusion, unnecessary data verification, and the inability to provide accurate, timely analyses. Furthermore, the lack of collaboration and data sharing which causes these occurrences prohibits compilation of a complete picture for the commander. The staff fails in performing its functions and potentially hinders the commander's ability to make optimal decisions.

Staff Section Data Requests

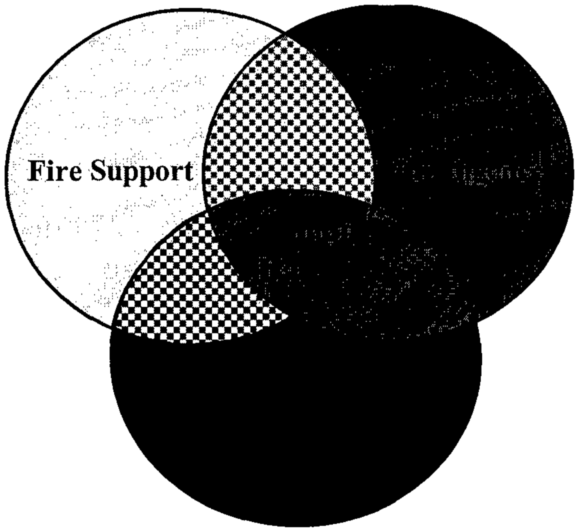

Figure 2. Staff sections request "Common Data" that is most often obtained through unnecessary overlap.

The 1 ID FSE's fire support information management problem:

How can the 1 ID FSE efficiently and effectively perform the information management functions of a TOC within the commander's compressed decision/analysis timeline that results from the use of Information-Age technologies?

A solution required near real-time information flow without creating another stovepipe. Data and information had to be freely accessible to everyone; units and staffs from battalion to division level and beyond. Event reports such as the AIF indirect fire report must be accessible between CPs. Data comprising the report must be stored in a database. And querying the database should be an autonomous capability; moreover, anyone with access to the network should possess the ability to query data. Figure 3 illustrates how FSEs functioned with respect to event reporting and data sharing during the train up. Spreadsheets, slide presentations, and word processed documents were the primary means of submitting and storing data. Regretfully these files were not shared or freely available within, between, or outside these formations. This was to be expected because entities within the same stovepipe do not share information, nor do they normally work with others because the systems they use are not designed to work collaboratively (Alberts and Hayes 2003: p57). Although not intentional, units and staff cells monopolized information.

Event Reporting During Train Up

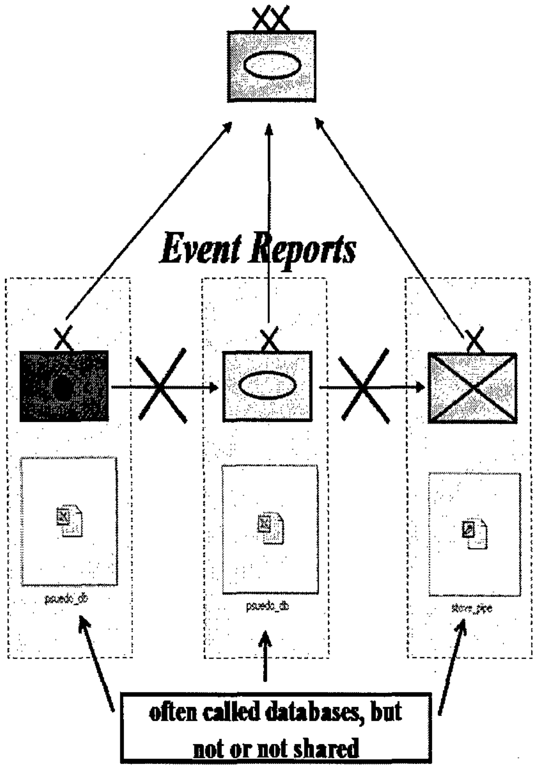

Figure 3. Staffs stored and submitted event reports using various means but the report data was neither shared nor available to others.

The way ahead required moving away from monopolies on information to information marketplaces. Only by establishing information marketplaces will we empower FSE sections, staffs, and units with the variety of views and perspectives necessary to make sense of the complex situations that our forces face (Alberts and Hayes 2003: pxvi).

A SOLUTION

I served as the Division Tactical Command Post (DTAC) Assistant Fire Support Coordinator (AFSCOORD) during the train up for deployment to OIF II. After a few CPXs and AARs it was evident that a solution to the FSE's problems required creative thinking. A solution needed to be dynamic, collaborative, and empowering. Commanders and staffs mutually agreed that today's CPs demanded a new breed of tools. And there is doctrine emphasizing that C2 tools must allow for widely accessible, shared data. Field Manual 3-90.3 states "C2 systems will inevitably migrate towards a Web-based capability, allowing information to be stored in a database and accessed by multiple users" (Department of the Army 2001b: p11-49). The FSE could not afford to wait for the inevitable. With this in mind, I decided that a Web-based capability needed to exist time now for fire support information management.

In the civilian sector, the adoption of the Internet and explosion of Web Applications, Web App, provide the unparalleled capability to extend the value and impact of key enterprise solutions (Farmer). Enterprise solutions such as Web Apps

collect and manage information flow across organizations and allow leaders to make decisions based on information that truly reflects the organization's current state (Cantrell et al p48). "The fundamental purpose of all Web applications is to facilitate the completion of one or more tasks" (Baxley). A Web App used as a fire support information system would be capable of collecting, processing, storing, displaying, and disseminating information. My hypothesis was that a properly designed Web-based fire support information system would solve the fire support information management problem.

The basis for my hypothesis was the relationship between the advantages of a Web App and the FSE's requirements. FSE and staff section computers throughout 1 ID were connected to the network and possessed a Web browser. A Web App neither requires a user to make special configuration changes nor to load special software; a browser is the only requirement. Updates to the Web App would be easy and transparent to all users. There would not be annoying interruptions in service that prevent conducting fire support business. Fire support information would be accessible to a wider audience. Unlike email and the Digital Dashboard, a Web-based information system allows everyone access to information. Being on the right email distribution list or having a user-ID and password for the Digital Dashboard would not be limitations. A Web App allows information access 24 hours a day, 7 days a week from anywhere. Users have "freedom of maneuver" and are not tied to a specific computer nor limited to a specific type of computer system such as AFATDS or ASAS-L (Paul Stanley Software 2004).

THE WEB APPLICATION MODEL

The basic Web App model consists of 3 tiers: User Services, Business Services, and Data Services. The User Services tier provides a visual gateway for users to interact with the application (Fernandes). In this model, Hypertext Markup Language (HTML) provides the visual gateway. User interactions with HTML invoke business logic and procedures from Business Services (Fernandes). This tier consists of Web scripting and server-side programming that permits the user to indirectly perform complex actions (Fernandes). The remaining tier is the Data Service layer where data is stored, retrieved, and updated (Fernandes). Databases are essential to collecting information from numerous sources on the battlefield and most practical for the FSE's requirements (Matthews 2004: p20). A database empowers users to store, retrieve, add to, and update categorical information in a systematic and organized manner (Fernandes). By using a database, the FSE avoids the unorganized, often misplaced files and "scraps of paper" that tend to circulate the CP.

Figure 4 shows the model for the 1st Infantry Division Artillery Portal (Div Arty Portal). The home page of the Div Arty Portal permits users to send Hypertext Transfer Protocol requests to a Web server via any Web browser. The Web server passes requests to business logic (computer code) that either pushes data into or pulls data from the Div Arty database. The computer code on the Java enabled server consisted of Java Servlets and Java Server Pages (JSP) that use Java Database Connectivity (JDBC) to interact with the database. Business logic performs a multitude of tasks; data pulls, calculations, formatting of results, and seamlessly transforms data into information. Users receive confirmation of task completion in the form of a Web page

that displays the requested information or a table reflecting the new data entry. It is important that I distinguish between the two types of users. Any user can request information from the Artillery Portal. However, some users, "trusted agents," use a user-ID and password to establish a unique session and create, manipulate, and permanently store data in the database (Baxely).

The Div Arty Portal

A Small-Scale Web Application

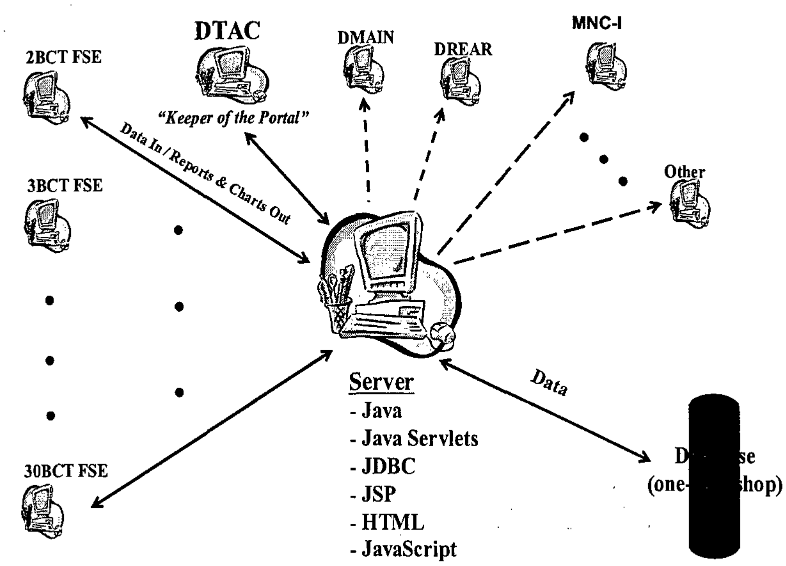

Figure 4. Solid lines represent two-way interactions (push and pull) available to "trusted agents." Dashed lines represent one-way interactions (pull) available to everyone.

A few examples of "trusted agent" data submissions are Radar Status Reports, Artillery and Mortar Combat Power Reports, Fire Mission Reports, and AIF Indirect Fire Attack Reports. Clients no longer require direct access to AFATDS/EMT, ASAS-L, or MCS-L to obtain the "Common Data" shown in Figure 2. Anyone with access to the Secure Internet Protocol Router (SIPR) network may access the Div Arty Portal. The portal empowers staffs with unlimited access to information from anywhere at anytime.

DYNAMIC REPORTING

The data FSEs submit into the portal resides in the Div Arty database. The purpose of this database is to provide the ability to dynamically transform *data* into *information* (GeekGirls). Data are what the FSEs collect and submit. Upon user request the business layer of the Portal automatically consolidates, organizes, formats, and performs analysis of the data thereby transforming data into a useful form - information (Coates 1999). Users have the independent ability to obtain "point and click" preformatted queries, charts, and graphs. The days of conducting repetitive, onerous exports of data from AFATDS/EMT or consolidating numerous emails were

over. Dynamic reports generated from the database saved hours daily. The time savings for the 1 ID FSE were most noticeable in preparation for the daily BUBs.

The FSEs contributions to the BUBs were aggregate radar status, radar performance for AIF indirect fire attacks, artillery and mortar combat power, fire missions executed, and planned fire missions for the next twenty-four hours. Collecting, consolidating, and formatting this data twice a day required too much time. FSE BUB preparation required three hours each morning and evening, six hours each day. Subordinate FSEs submitted data via emails with a slide presentation attached. The division FSE consolidated and formatted the data and subsequently emailed the data back to subordinate FSEs who were to ensure their data was reflected correctly. Email delays and consolidation errors made preparing for BUBs a laborious, time-consuming process.

The "Dynamic" Drumfire Update, see Figure 5, is one of many examples of leveraging technology through use of the Div Arty Portal to perform the time-consuming tasks required for a BUB type requirement. I designed this briefing tool using Servlets and JSP that make data calls to the database and return information in a format that looks like a slide presentation. All required FSE BUB contributions and more were available in this dynamic briefing. This tool minimized redundant data inputs and made for a more efficient process (Canterinicchia 2003). FSE BUB preparation required minutes not three hours. The FSE briefed directly from the "Dynamic" Drumfire Update; we were out of the data collection and slide making business.

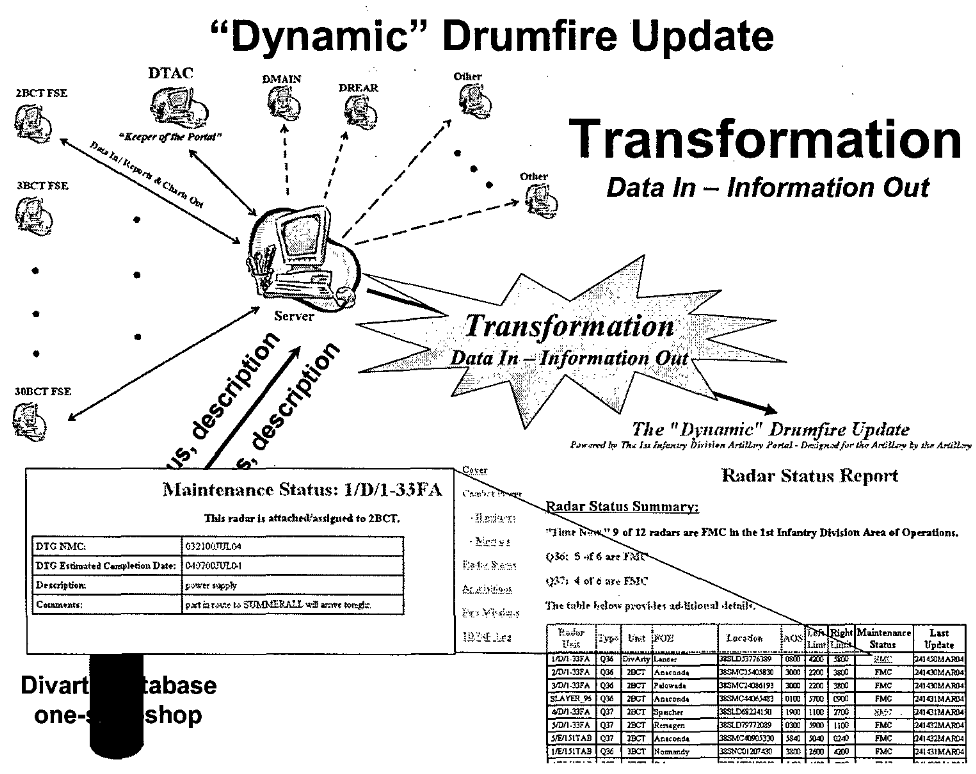

Figure 5. Business logic eliminated the repetitive, onerous, time-consuming tasks associated with data collection and consolidation.

The status of radar assets was a part of the Commander's Critical Information Requirements and briefed at each BUB and "5 Minute Drill." The 5 Minute Drill was a "no notice" briefing to the Assistant Division Commander for Maneuver within five minutes of his request. Notification of a 5 Minute Drill caused a mad dash to collect data and update briefing slides. The Drumfire Update eliminated the chaotic scrabble to collect and consolidate data. The aggregated Radar Status Report, see Figure 5, was available on demand. Subordinate FSEs updated the status of their radar(s) immediately after a change in status and at scheduled times twice per day. The status change was instantly visible on reports and the reports incorporated a drill down capability that included details (Paul Stanley Software 2003). Clicking the non-mission capable link associated with a radar, see Figure 5, instantly provided a table containing additional details. This type dynamic briefing tool is an example of how to leverage technology in order to provide a commander quantifiable, more, or better information in a timely manner (Glasow 2004: p9).

The "Dynamic" Drumfire Summary is another "point and click" report that saved the 1 ID FSE numerous hours. This report, see Figure 6, provided leaders a detailed summary of radar statuses, radar performance for each AIF indirect fire attack, artillery and mortar combat power, fire missions executed, and planned fires for the next twenty-four hours. Clicking the hyperlink "Dynamic" Drumfire Summary commanded business logic to pull the most current data from the Div Arty database, perform calculations, organize, format, and return the result within seconds. The summary is a near real-time document, updated instantaneously from the most current modifications "trusted agents" make to the database. The Deputy Fire Support Coordinator used this summary daily at division level meetings and was always armed with the most up to date fire support information.

"Dynamic" Fire Support Summary

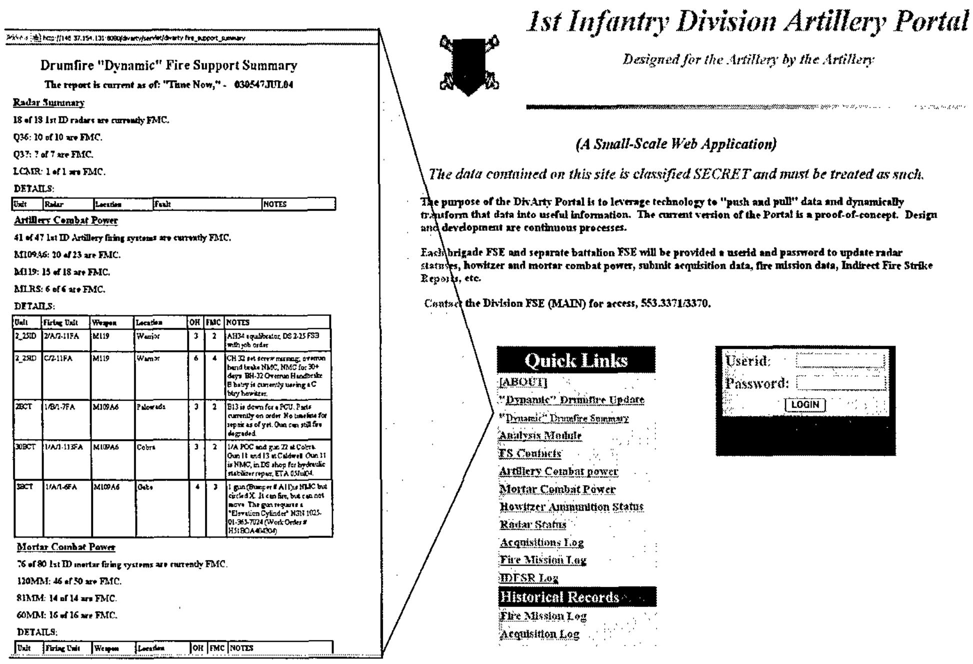

Figure 6. The Dynamic "Drumfire" Fire Support Summary provided leaders a summary of all fire support information within 1 ID.

Dynamic reporting made available through the "Dynamic" Drumfire Update and "Dynamic" Drumfire Summary saved the FSE hours each day. The reduction in data management time freed the FSE to concentrate on actual analysis (MORS Workshop 2005: p13).

DYNAMIC ANALYSIS

Operations in combat require dynamic reporting and tools that support dynamic analysis. Unfortunately, the current warfighting systems within our CPs do not output analytical-ready data and support for dynamic analysis (Baer and Michealson 2004: p21). Simple analysis requires data extraction from ABCS components, file manipulation, and charting and/or graphing. This procedure is time-consuming and has to be repeated each time the data set changes. Data extraction, and charting and graphing could be accomplished seamlessly if analysts had a tool with direct access to the most current data (Adept Scientific). The desired tool is one capable of automating these tasks and displaying information according to user requirements with the click of a button (Department of the Army 2001a: p11-11). I designed the Analysis Module to provide these features through a robust selection of dynamic graphs and tables for analysis products. Drop-down menus provide effortless variation of parameters for graphs and tables and the resulting graph or table appears within seconds. Thus, exploratory analyses are easier to perform. And all analysis products are generated using the most current data "trusted agents" entered.

A question of interest at the 1 ID general officer level and above was, "How are the radars performing?" Commanders desired continuous radar coverage of FOBs, but

radar maintenance also had to be performed. So a closely related question was, "When is the best time to perform radar maintenance?" A universal maintenance schedule did not work because the enemy had a vote. The AIF's tactics, techniques and procedures (TTP) varied across the different Areas of Operation (AO). The time of day at which a radar section maintained a radar did not mean that the enemy would not conduct an indirect fire attack. Jim Krane's "Computer-sleuthing aids troops in Iraq" provided insight for a technique that proved very useful. Krane stressed the importance of performing pattern analysis (Krane 2003). Viewing enemy indirect attacks and radar acquisitions as individual events was not beneficial. However, viewing a series of attacks and their corresponding radar acquisition data provided a more beneficial picture.

FSEs entered data for each AIF indirect fire attack and associated radar acquisition. Therefore, it was possible to view the performance of radars providing coverage for FOB *X* during a specified date range, see Figure 6. Additionally, it was possible to view the time of attacks for the same date range, see Figure 7.

FOB *X*: Percent Indirect Attacks Acquired (D to D+6 MMM YY)

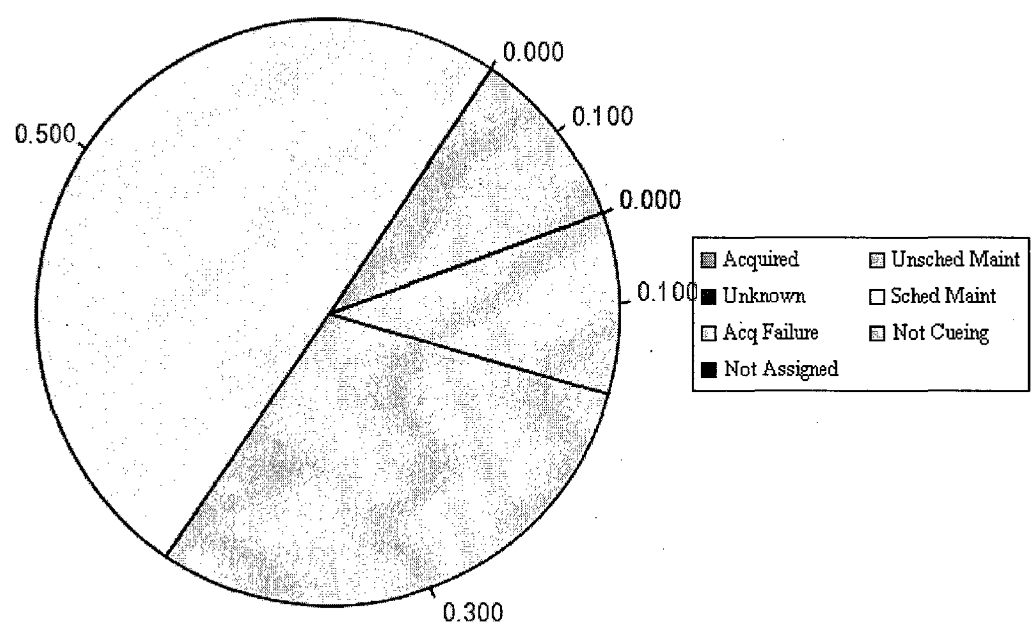

Figure 6. The performance of the radar providing coverage for FOB *X* during a seven day period.

Figures 6 and 7 show that the radar providing coverage for FOB *X* was not acquiring fifty-percent of AIF indirect fire attacks because the radar section performed scheduled maintenance during the most likely time period for an attack. The FSE provided this data to the Task Force Executive Officer on FOB *X* who controlled the radar section's maintenance schedule. The executive officer was thankful and corrected the situation. The radar section was able to acquire future AIF indirect fire attack and provide acquisition data to the Task Force. As a result, the Task Force was able to fire counterfire, and locate and destroy AIF firing systems and caches. Analysis products such as the graphs in Figures 6 and 7 were available within seconds using the

Div Arty Portal. The Portal provided more than a means to collect data. Using the Portal meant information and the dynamic tools to perform analysis were instantly and widely available to those who needed them (Alberts and Hayes 2003: p102). Users were empowered to bring information and analysis to bear.

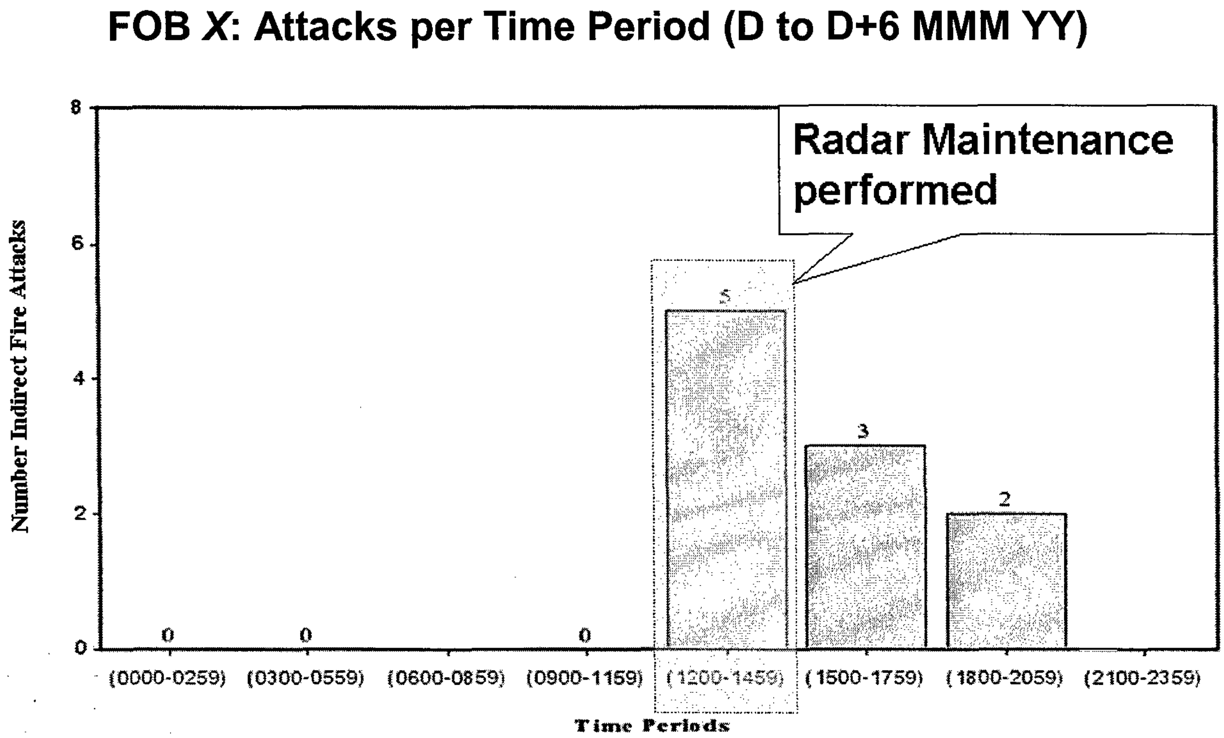

Figure 7. A histogram of enemy indirect fire attacks on FOB *X* during the same date range as shown in Figure 6. The box overlaid on the histogram of shows the time period when the radar section performed scheduled maintenance.

MEASURES OF EFFECTIVENESS AND PERFORMANCE

Part of the 1 ID Fires and Effects Coordination Cell's (FECC) responsibilities was integrating lethal and nonlethal fires into the Division's operations. Operations ranged from kinetic, offensive operations to unit projects such as building schools for Iraqi children. The FECC required units to provide feedback on these operations and the FECC had the daunting task of measuring 1 ID's success. The prevalent question was: How do we [1 ID] know if we are being successful? The FECC's methodology for obtaining answers required developing an extensive listing of Measures of Effectiveness (MOE) and procedures to analyze and evaluate success (Sproles 1999). Of particular interest was the amount of progress being made in reducing the number of AIF indirect attacks against coalition FOBs.

1 ID used a variety of lethal and nonlethal fires to decrease attacks against FOBs. Lethal fires included but were not limited to the use of sniper teams and counterfire. Nonlethal fires included such methods as Spheres of Influence engagements with local sheiks and presence patrols. 1 ID's objective was to use the synergy of lethal and nonlethal fires to decrease the value of the MOE, Attacks per Day.

$$Attacks\ per\ Day = \frac{Number\ of\ Attacks\ during\ Time\ Period}{Time\ Period},\ Time\ Period\ is\ in\ days$$

Figure 8 shows a decrease in Attacks per Day from April to June 2004. Although 1 ID successfully decreased Attacks per Day, reports of effective AIF indirect attacks did not seem to decrease. 1 ID defined effective attacks as those that caused damage or injury to property or personnel and therefore reduced combat power. The MOE, Percent Effective Attacks, allowed the FSE and FECC to examine the situation.

$$Percent\ Effective\ Attacks = \frac{Number\ of\ Effective\ Attacks\ during\ Time\ Period}{Number\ of\ Attacks\ during\ Time\ Period},\ Time\ Period\ is\ in\ days$$

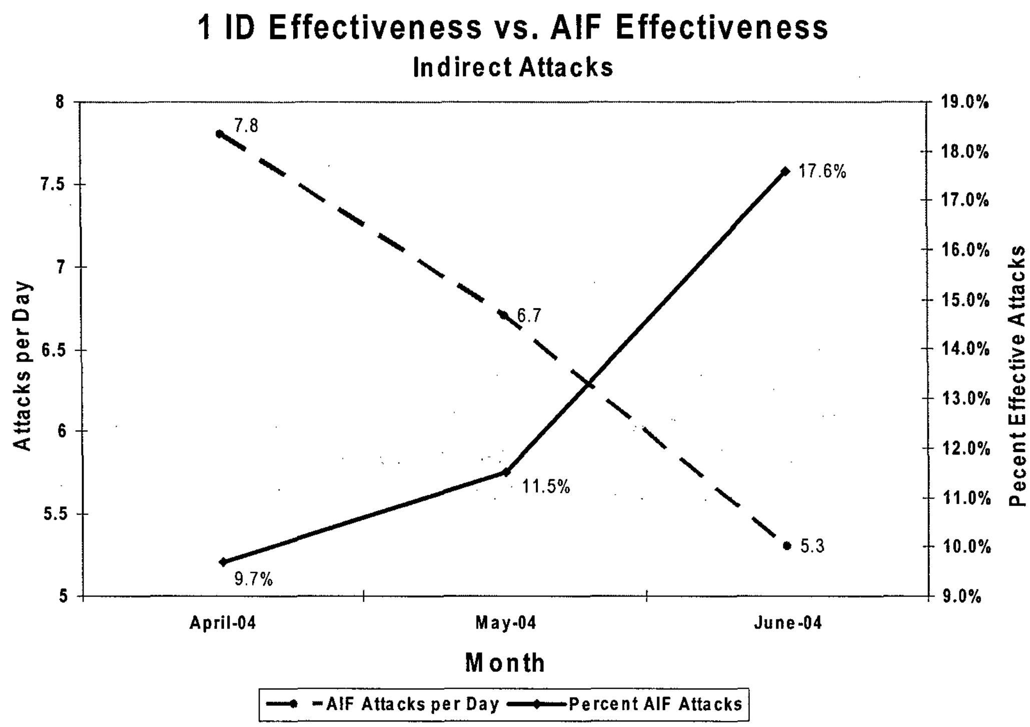

Figure 8. 1 ID successfully decreased Attacks per Day, but no Percent of Effective Attacks. AIF continued reducing 1 ID combat power.

During the time period in which unit operations reduced the Attacks per Day, AIF sustained the ability to conduct effective indirect attacks and therefore reducing 1 ID combat power.

Intelligence sections and units examined the causes and found that AIF improved their TTPs for indirect attacks. AIF attackers used better methods to deliver indirect fires and gained better intelligence. Investigation of enemy firing positions revealed the use of aiming stakes and gunner's quadrants. Some attackers were captured and found to have been workers on FOBs or had ties to those working on FOBs. Workers used various means to determine the location of coalition equipment, living quarters, and dining facilities and passed the information to AIF. Countermeasures included units

providing FOB security re-looking procedures for granting local nationals access to FOBs and stringently enforcing escort requirements. Units also continued to improve force protection by placing barriers around living areas and dining facilities. Additionally, units conducted pre-planned indirect fires on suspected enemy firing positions. These countermeasures proved to be very effective in some AO. For example, in the 3rd BCT's AO the use of pre-planned fires and counterfire in conjunction with other operations helped decrease attacks against FOBs.

Commanders used counterfire in an effort to decrease the Attacks per Day against their FOBs. To be effective, counterfire had to be responsive. Responsiveness meant minimal time between sensor detection (radar acquisition) and firing of an artillery or mortar fire mission. The 1 ID CG's goal was to execute counterfire within two minutes. The Measure of Performance (MOP), Sensor Shooter Link, provided a means to obtain feedback. The value of the MOP was defined as the time between radar acquisition and execution of the counterfire mission. The major component of this MOP was the time required for clearance of fires. Briefly, clearance of fires is a method maneuver commanders employ in order to prevent the occurrence of fratricide. Recognizing that the first priority was the prevention of fratricide, commanders at all levels wanted responsive counterfire. A graph in the Analysis Module, see Figure 9, provided FSEs and units feedback on performance. As a result, FSEs and units had tangible data enabling them to refine their clearance of fire procedures in order to achieve the CG's goal.

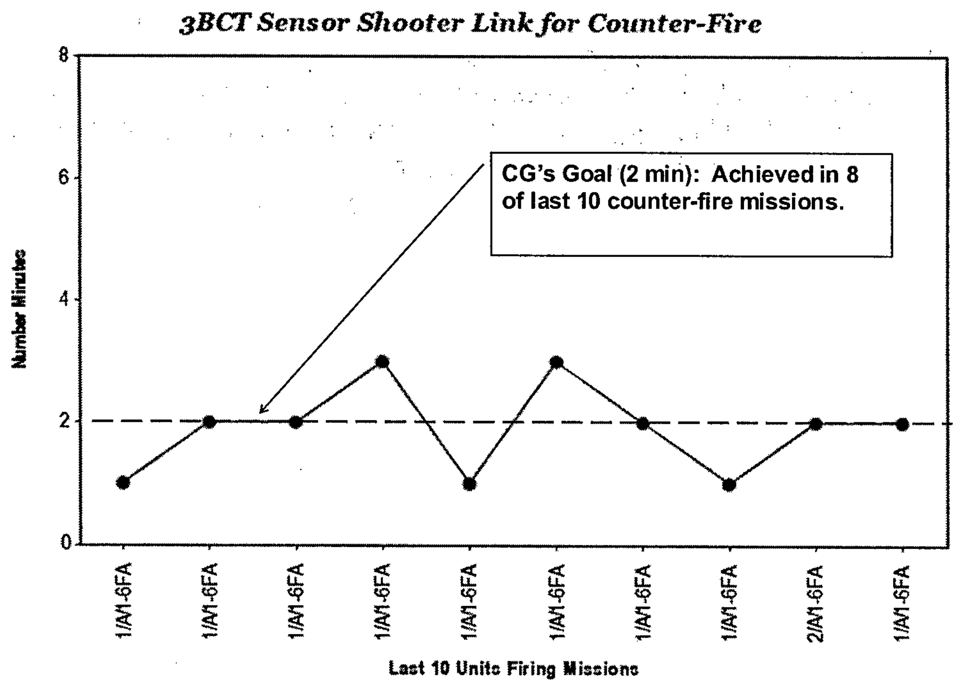

Figure 9. The Portal's business logic used FSEs' input for indirect fire reports, radar acquisitions, and counterfire missions to dynamically present information about the value of the MOP Sensor Shooter Link.

UPGRADES "On the Fly"

Development of the Artillery Portal began in October 2003 and upgrades are a continual process. Upgrades include rewrites of code to decrease processing time and enhancements to analytic tools or the addition of new modules. All upgrades were made and instituted "on the fly" from remote locations. The portal permits modifications from any SIPR computer connected to the network. For example, after I departed the FSE, the new AFSCOORD requested the addition of a one-stop-shop for planned fires information. The purpose was to provide the ability for subordinate FSEs to request mortar and howitzer fire missions, registration and calibration missions, and terrain denial fires. The division FSE reviewed and sought approval for the mission requests and updated each request's status as approved, denied, or pending. The benefit was the widespread availability of information from one source. Army units and Air Force liaisons had a common picture for the status of fire missions affecting airspace.

Following development and testing, I remotely loaded the software and users did not incur downtime or other interruptions. "Trusted Agents" saw a new feature on the options menu and began use after receiving instructions. All other consumers of planned fires information no longer received emails with attached spreadsheets of planned fires information. Rather they received the link to the Div Arty Portal in order to view planned fires information and instructions on how to query historical planned fires data. The Planned Fires Module eliminated the question, "Do I have the most current planned fires data?"

Upgrades have been made as recently as December 2005 and additional upgrades are being developed for deployment in January 2006. A noteworthy point is that the Portal's server is in Tikrit, Iraq and changes are being made from Bamberg, Germany. The Portal design is somewhat robust and avoids the crisis of how to maintain a Web App that Susan Dart describes in her article "Webcrisis.com: Inability to Maintain" (1999). The Div Arty Portal can be maintained from any SIPR computer in Iraq, Europe, or the United States.

CHALLENGES

The significant challenges associated with developing and instituting a system such as the Div Arty Portal were gaining the technical skills required for project development and changing a mindset. Development of a Web App requires expertise in Web design, server-side programming, and database management. Such skills are neither required nor expected in a staff section of an operational unit. Commonly units utilize contractors to develop such projects. Fortunately, I obtained some of these skills during graduate school and during an ORSA utilization tour. And although I do not serve as an ORSA, my recent experience allows me to wholeheartedly agree with a MORS Working Group recommendation. Analysts supporting operations should be highly skilled in information management and the tools needed to make this an efficient process (MORS Workshop 2005: p11).

No matter how talented analysts are in information management, customers must be willing to accept new techniques and procedures. 1 ID leaders and subordinates agreed that CPs needed a new set of tools. However, some were not comfortable with using a Web App for military purposes. Many were familiar with online banking and online ordering but did not see the benefit of such an application for C2.

Status quo ante was a prevailing theme. There must be a way to solve the FSE's information management problem using the tools with which most were familiar, spreadsheets and slide presentations. The idea using of a Web App caused many to venture outside their comfort zone. Most had not truly embraced the benefits available through the use of Information-Age technologies. An Army initiative to send a larger number of junior officers to graduate school may help in this area (Tice 2005: p32). As more junior leaders obtain masters degrees, especially in the technological disciplines, there may be a larger population of leaders who have an appreciation for these type systems and the capabilities these systems bring to the fight. This change in the institutional training is what is needed. Exposing Army officers to information technologies at a much earlier stage in their careers is a must for the Army to reap the benefits of NCO (Hartzog 2001: p4).

RELATED APPLICATIONS

The use of the Web App model is not limited to a fire support information system. I have used the same type model in research to solve problems within 1 ID since Summer 2002. Similar research includes:

- Maintenance Management – Instituting the Maintenance Portal allowed an undermanned brigade rear detachment staff and contract maintainers to manage scheduled services and maintenance for eight subordinate units and over 1000 tactical vehicles.
- Social Event Management - The Division Artillery annually hosts social events with over 500 attendees each. Implementing a Web-based system for managing RSVPs, meal choices, payments, table seating, name card production, etc. saved unit adjutants and their section countless hours. Additionally, event planners had instant access to the most current event information.

CONCLUSION

The Div Arty Portal is a dynamic information system for the dynamic environment in which the Army operates.

- 2004 Army Knowledge Awards Banquet

The Div Arty Portal provides a real-world example of how a Web App can be used within a tactical unit to leverage IT to solve a problem. Most noteworthy is that this fire support information system unencumbered the FSE and permitted a shift in focus from data collection to analysis. The Portal freed the 1 ID FSE of 2190 hours, 3 months – a quarter of the OIF II rotation, of data collection and slide making. The timesavings are measurable; however, we cannot quantify the benefits this system provides in areas such as the performance of radars or evaluation of MOEs. The implementation of analysis made possible with the Portal may help save lives.

The major hurdles that lay ahead for projects such as the Div Arty Portal are exposure to and embracing of these systems and the capabilities they bring to the fight. In time, our Army will clear these hurdles and move closer to implementation of NCO. Meanwhile, embedding ORSAs who have expertise in information management within unit formations might speed the process.

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LIST OF ABREVIATIONS

1 ID	1st Infantry Division
ABCS	Army Battle Command System
AFATDS	Advanced Field Artillery Tactical Data System
AFSCOORD	Assistant Fire Support Coordinator
AIF	Anti Iraqi Forces
AO	Area of Operations
ASAS-L	All Sources Analysis System-Light
BUB	Battle Update Brief
C2	Command and Control
CP	Command Post
CPX	Command Post Exercises
Div Arty	Division Artillery
DTAC	Division Tactical Command Post
EMT	Effects Management Tool
FECC	Fires and Effects Coordination Cell
FM	Field Manual
FOB	Forward Operating Base
FSE	Fire Support Element
HTML	Hypertext Markup Language
IT	Information Technology
ITO	Iraqi Theater of Operations
JDBC	Java Database Connection
JSP	Java Server Pages
MCS-L	Maneuver Control System-Light
MOE	Measure of Effectiveness
MOP	Measure of Permance
NCO	Network Centric Operations
OIF II	Operation Iraqi Freedom II
SIPR	Secure Internet Protocol Router
TOC	Tactical Operations Center
TTP	Tactics, Techniques and Procedures

DESCRIPTOR LIST

Web Application

Fire Support

Information Technology

1st Infantry Division

OIF

Java

Servlets

database